



December 2010

# Senate Bill 513 Ecosystem Services and Markets

Report from the Oregon Sustainability Board to the 2011 Legislative Assembly



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*Report From*

The Oregon Sustainability Board

*for the*

Oregon Legislative Assembly

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# I. Executive Summary

Clean air, safe drinking water, and habitat for fish and wildlife are all examples of ecosystem-derived public resources, or “ecosystem services” that comes from natural processes and biological diversity. In some cases, these services are achieved through active conservation, restoration and management of land, water and air. We often take these services for granted.

Many ecosystem services originate on private lands. But those who own, manage, and restore lands that produce these services historically have been compensated only through established markets for traditional products, such as food and timber. Innovative programs are emerging that focus on payments for ecosystem services and ecosystem services markets. These programs attach value to nature’s benefits and calculate that value in monetary units, then bring buyers and sellers together to trade ecosystem services for financial payments. Rather than relying on a landowner’s environmental altruism or fear of regulatory restrictions, payments and markets may provide financial incentives to protect and enhance ecologically significant lands in efficient and cost-effective ways.

Equally as important, these approaches create jobs. A study by the Ecosystem Workforce Program at the University of Oregon found that forest and watershed restoration projects have considerable economic impact and job growth potential. For every \$1 million invested, 20 jobs and over \$2.3 million in total economic activity were returned for river and road restoration; 13 jobs and \$2.2 million in economic activity were generated from mechanical forest projects such as thinning; and 29 jobs and \$2.1 million in economic activity could come from tree planting and manual thinning.<sup>1</sup> Oregon’s landowners can and, in some cases, already do, sell improved ecosystem services, generating income that helps farm, forest, and other landowners remain viable, while also benefitting their local communities through the creation of restoration related jobs.



*Bruce Taylor, Defenders of Wildlife*

Ecosystem services markets may offer an “alternative path” to traditional regulatory processes intended to protect Oregon’s environment. Regulated parties (e.g., developers) could satisfy their obligations under natural resource statutes by investing in ecosystem services projects or credits that provide measurable ecological outcomes and have the potential to result in multiple benefits to the environment. The incentive to participate in such programs could be streamlined permitting and reduced administrative costs as compared with traditional compliance mechanisms.

As an example, CleanWater Services, a water resources management agency in Washington County, Oregon, received the first-ever fully integrated municipal National Pollutant Discharge Elimination System from the Oregon Department of Environmental Quality in 2004. The permit allows trading of water quality credits based on temperature, oxygen-demanding chemicals and other pollutants to help achieve water quality goals. By investing in riparian restoration instead of engineered cooling systems, the agency saved money, reduced energy use, and achieved habitat restoration benefits. Estimated cost for the engineered cooling towers ranged from \$60 million to \$150 million. The “natural infrastructure” approach of streamside plantings

<sup>1</sup> Mosely, C. and M. Nielsen-Pincus. 2009. Economic Impact and Job Creation from Forest and Watershed Restoration: A Preliminary Assessment. Ecosystem Workforce Program, Briefing Paper #14, University of Oregon.

will total approximately \$6 million. The use of ecosystem services approaches can save money, encourage innovative and effective restoration actions over the long term, and provide a more sustainable means for achieving environmental goals.

With the passage of Senate Bill 513 (SB 513) in 2009, and a number of ground-breaking pilot projects, Oregon leads the nation in creating a framework for markets for ecosystem services to efficiently maintain ecological benefits, encourage environmental restoration, and sustain local economies. This report, prepared by the Oregon Sustainability Board with input from the Ecosystem Services Markets Working Group and its ad hoc advisory group, offers recommendations to create a successful ecosystem marketplace. During the year-long SB 513 process, 10 policy proposals were developed to promote development and implementation of an integrated ecosystem marketplace in Oregon:

*To invest effectively and efficiently in the most important ecosystem services,*

**Policy Proposal #1:** Ensure conservation and restoration goals are integrated across state agencies to focus state investments and priorities.

*To streamline implementation of ecosystem services markets in Oregon,*

**Policy Proposal #2:** Continue to identify and address statutory and administrative impediments to state agencies' and local governments' use of ecosystem market approaches and tools.

*To create a functioning marketplace with transparent rules and processes,*

**Policy Proposal #3:** Encourage public-private partnerships to develop standardized tools and processes for accounting and approving ecosystem credits and payments.

*To jump-start ecosystem marketplace investments where appropriate,*

**Policy Proposal #4:** Provide authority and direction to State agencies and encourage local governments to purchase credits and invest in ecological outcomes that are consistent with state conservation and restoration goals.

*To create opportunities for public-sector entities with marketable credits,*

**Policy Proposal #5:** Allow state agencies and local governments to sell credits under limited circumstances.

*To identify opportunities for further improvement and refinement,*

**Policy Proposal #6:** Use an adaptive management framework to consistently and collaboratively evaluate ecosystem services approaches.

*To ensure that environmental solutions are considered on par with engineered infrastructure,*

**Policy Proposal #7:** Encourage state and local governments to cost, compare, and consider natural infrastructure as an alternative to hard engineering for new development projects and mitigation.

*To facilitate ecosystem services being considered in evaluations of costs and dividends during land-use planning,*

**Policy Proposal #8:** Encourage state and local governments to make policy-level land use and development decisions that fully consider the services ecosystems provide at an ecologically appropriate scale.

*To learn from pilot projects,*

**Policy Proposal #9:** Provide a testing ground and stimulate demand for payments for ecosystem services.

*To address ongoing and emerging issues around ecosystem services markets,*

**Policy Proposal #10:** Continue the dialogue with interested and affected parties to further facilitate development of ecosystem services and market approaches.

The report's policy recommendations include both administrative and legislative options for action. Because the Oregon Sustainability Board is mindful of the challenging fiscal environment facing the state in 2011, the near-term implementation actions (e.g., actions that could be taken during 2011 Legislative session) have little-to-no fiscal impact to state government.

## II. Introduction

### What are Ecosystem Services and Markets?

Ecological values are the “clean air, clean and abundant water, fish and wildlife habitat and other values that are generally considered public goods.” Ecosystem services build on these ecological values and are “the benefits that human communities enjoy as a result of natural processes and biological diversity” (from Oregon Senate Bill [SB] 513). In fact, not only do they provide benefits, ecosystem services are required for the functioning of society and the economy. Examples of critical services include:

- o Climate regulation by trees taking in carbon dioxide,
- o Water supply and storage to protect against droughts and floods (e.g., wetlands and floodplains recharging groundwater supplies,
- o Maintenance of water quality and availability (e.g., shading of streams by trees, wetlands and riparian areas filtering stormwater),
- o Maintenance of soil fertility,
- o Habitat that supports fish and wildlife populations,
- o Pollination, and
- o Recreational, nature-based opportunities for humans.

Economists have attempted with varying success to assign monetary values to the benefits of ecosystem services, including recreation, impact on property values, natural water filtration, aesthetic values, and



*Bruce Taylor, Defenders of Wildlife*

other benefits. A pre-eminent study of the economic significance of ecosystem services found that a conservative estimate of the value of ecological systems was US\$33 trillion, or 183% of global gross national product at that time.<sup>2</sup> Information about the monetary value of ecosystem services is useful to decision-makers who need to make choices such as where and how communities expand, which crops are best grown on different parts of the landscape, and how to protect natural systems for future generations. Globally, ecosystem services are starting to be recognized as critical ecological underpinnings of every economy.

Payments for ecosystem services offer financial opportunities to landowners in exchange for managing land in a way that provides one or more ecological values or ecosystem services. The beneficiaries of ecosystem services—whether they are the public, an environmentally conscious corporation, or a developer needing to mitigate impacts—pay the providers of ecosystem services for these environmental benefits. Ideally, ecosystem service restoration and/or conservation are the successful outcomes of such payments. Four relatively distinct categories of payments for ecosystem services exist already, and are outlined in Box A on the next page.

<sup>2</sup>Robert Costanza et al., “The Value of the world’s ecosystem services and natural capital,” *Nature* 387 (1997): 253.

While efforts to pay for preserving or enhancing ecosystem services have been in place for decades, an increased focus on natural resource degradation worldwide has accelerated development of new types of payments and markets for ecosystem services. Measuring and analyzing the ecological results of both established and emerging market-based approaches does not consistently occur, but are critical to demonstrating that ecosystem services markets are a viable tool for conserving and restoring natural resources.

An ecosystem services market is simply an organized structure that brings buyers and sellers together to exchange payments for ecosystem services much like a commodity share in a stock exchange. Landowners generate credits—units of ecological value—by protecting and restoring ecological “assets” to provide needed services. Once their work has been inspected by third party verifiers trained in marketplace protocols and standards, they would post their credits in a marketplace’s credit registry. Buyer- regulated entities and conservation-conscious consumers- could then purchase credits from the registry.

Ecosystem services markets are not a magic solution to the challenges and limitations facing natural resources management. However, they do provide an additional tool for landowners and resource practitioners and may offer an ecologically responsible and economically viable alternative for restoring natural resource functions.

*Incentives programs* have existed for many decades in the form of incentive payments from federal, tribal, state and local governments to private landowners to implement conservation practices. For example, the Conservation Reserve Program sponsored by the U.S. Department of Agriculture provides financial assistance to eligible farmers and ranchers to address soil, water, and related natural resources concerns on their lands in an environmentally beneficial and cost-effective way.

*Voluntary markets* for ecosystem services occur when individuals or companies purchase ecosystem services without being required to do so. Motivations may be philanthropic and associated with making a positive contribution to the environment, or to gain market share through eco-labeling or other green marketing approaches.

*Pre-compliance markets* emerge when buyers and sellers of ecosystem services anticipate that a certain resource will be regulated in the future. They invest while the prices of generating and/or buying ecosystem service credits are low with the expectation they will reduce the cost of compliance in the long term, sell the credits for a profit in the future, or both. (An ecosystem service credit is a single unit of trade that quantifies the provision [or right of use] of a regulated or non-regulated ecosystem service.)

*Compliance markets* are created by regulations. Buyers of ecosystem services credits in these markets are required to do so to comply with a federal, state or local regulation. An example of a compliance market is wetland mitigation. In order to compensate for unavoidable impacts to aquatic resources, developers are required to replace lost wetland functions—or mitigate. Historically, such regulations emphasized on-site and in-kind mitigation, which resulted in wetland creation or enhancement inside the boundary of the development action, recreating a wetland of similar type.

BOX A: Four categories of payments for ecosystem services.

## Markets in Practice

Innovative examples of payments for ecosystem services are becoming common. In *Oregon* governments, businesses and conservation groups are national leaders in establishing and growing the development of ecosystem services markets.<sup>3</sup>

<sup>3</sup>Gail L. Achterman and Robert Mauger, The State and Regional Role in Developing Ecosystem Service Markets, Duke Environmental Law & Policy Forum, Vol. XX, Number 2, Summer 2010, pages 291-337.

- ***The Climate Trust*** was established in 1997 to provide a monetary path for mitigation of power plant emissions. These businesses provide payments to The Climate Trust, which then solicits and finances carbon credit projects to offset their impacts, enabling the companies to meet a new state emissions standard. The Climate Trust is one of the largest bankers of carbon offsets in the United States with \$8.8 million invested in a diverse portfolio of carbon reduction projects, and is one example of how ecosystem services markets deliver efficient, cost-effective environmental results.
- The ***Deschutes River Conservancy, The Freshwater Trust, and Columbia Basin Water Transactions Program*** provide examples of ecosystem services markets related to water resources in Oregon. Over the past decade, collaborative efforts such as these have demonstrated how cities and real-estate developers, landowners, local irrigation districts, and the Oregon Water Resources Department can achieve water quality and quantity goals in the Columbia Basin. The efforts have helped meet the Oregon Fish and Wildlife Department’s targets for streamflow on priority rivers, benefitted a significant fishery for the Columbia River Tribes and the state, and compensated those who contributed to clean water and streamflow improvements.
- As part of a complementary initiative, the ***Bonneville Environmental Foundation***, which previously established itself as a retailer of energy certificates, began selling water restoration certificates in 2009 as part of a voluntary market. This program allows water consumers to purchase a certificate that returns water flow to a river or stream that is equivalent to the amount of water they would have used. Funds from these purchases are used to pay holders of water rights to keep their water in the stream, instead of withdrawing it for other uses. Currently, they are actively investing in instream flow in the Deschutes and Rogue basins.
- ***Clean Water Services***, a water resources management agency in Washington County, Oregon, received the first-ever fully integrated municipal National Pollutant Discharge Elimination System (NPDES) permit from the Oregon Department of Environmental Quality in 2004. The permit allows trading of water quality credits based on temperature, oxygen-demanding chemicals and other pollutants to help achieve water quality goals. By investing in riparian restoration instead of engineered cooling systems, the agency saved money, reduced energy use, and achieved habitat restoration benefits. Estimated cost for the engineered cooling towers ranged from \$60 million to \$150 million. The “natural infrastructure” approach of streamside plantings will total approximately \$6 million.
- The ***Eugene Water and Electric Board***, a public utility in the McKenzie River Basin, is testing a number of similarly innovative, energy efficient, and restorative partnerships and ecosystem services solutions.
- The ***Willamette Partnership***, a broad-based coalition of stakeholders committed to restoring the health of the ecologically, socially, and economically complex Willamette Valley, began building the tools and infrastructure to help purchase and sell ecosystem service credits in compliance markets. The Partnership has developed model agreements with federal, state, and local agencies; user-friendly resource calculating tools; multiple-credit accounting systems; and understandable crediting protocols for four types of ecosystem services: salmon habitat, wetlands, upland prairies, and riparian shading (temperature credits), with more to be developed in the future.

- The River Plan, developed by the *City of Portland*, is a comprehensive, multi-objective plan for the land along the Willamette River that strives to balance jobs, natural resources, access to the river and livable communities. It will update and replace the 1987 Willamette Greenway Plan, zoning code, and design guidelines, which serve as Portland’s compliance with State Planning Goal 15 (Willamette River Greenway). The new River Plan will help set the course for the next twenty years—guiding, inspiring and facilitating actions along the Willamette River—and includes ecosystem services approaches, such as the purchase of credits from mitigation banks to mitigate for unavoidable impacts to natural resources.

Elsewhere in the United States, *Florida* has recently mandated annual reports from state departments on the status of the ecosystem services produced by lands under their jurisdiction. *Ohio* established the Great Miami River Watershed Water Quality Credit Trading program, which pays landowner to reduce pollutant runoff into rivers and streams. In this program, the Soil and Water Conservation District works with local farmers who agree to voluntarily change their farming practices to reduce phosphorus and nitrogen runoff. This program could offset the need for treatment plant upgrades, saving communities more than \$300 million over the next 20 years while significantly improving water quality. *The Chesapeake Bay* consortium of eight states is home to the Bay Bank, which works with landowners to adopt land management practices that enhance water quality, mitigate climate change, and improve ecosystem health and function. The bank provides one regional, multi-credit, ecosystem services platform and builds on national, state, and local ecosystem markets, including carbon sequestration, water quality protection, forest conservation, habitat conservation, and traditional conservation programs.

At the national level, the Natural Resources Conservation Service, U.S. Environmental Protection Agency, U.S. Forest Service, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service and other agencies have recognized Oregon’s leadership in ecosystem marketplace development and are collaborating with multiple partners in Oregon, in support of ecosystem services market development in the region. The Office of Environmental Markets was created within the U.S. Department of Agriculture in 2008, and has a unique role in the federal government’s efforts to develop uniform standards and market infrastructure that will facilitate market-based approaches to agriculture, forest, and rangeland conservation.



*Image by Shutterstock, Courtesy of Defenders of Wildlife*

Approaches that protect and restore ecosystem services have great potential for addressing environmental issues. Some of the approaches are still in the development and experimentation stage (e.g., comparisons of effectiveness between engineered and natural infrastructure). Early results suggest that market-based tools have the potential to provide a valuable alternative in natural resource management that should continue to be explored and institutionalized.

## Why Ecosystem Services Markets for Oregon?

Ecosystem services markets harness the power of economic incentives to protect and restore the services that ecosystems provide to society. Moreover, payments for ecosystem services create jobs. A study by the Ecosystem Workforce Program at the University of Oregon found that forest and watershed restoration projects have considerable economic impact and job growth potential. For every \$1 million invested, 20 jobs and over \$2.3 million in total economic activity were returned for river and road restoration; 13 jobs and \$2.2 million in economic activity were generated from mechanical forest projects such as thinning; and 29 jobs and \$2.1 million in economic activity could come from tree planting and manual thinning.<sup>4</sup> While these jobs may be short-term in nature, ongoing demand for such restoration work could result in a consistent demand for Oregon workers involved in a “restoration economy.”

With sufficient infrastructure in place to support viable ecosystem service markets, Oregon’s landowners can and already do sell the improved services their environmental restoration and conservation projects provide. These projects generate income that helps farm and forest operators remain viable and benefits communities. Local watershed councils, soil and water conservation districts, and other organizations design and manage projects. Ecological restoration professionals, machine operators, and fencing crews are hired to design and implement the restoration work. Expanding ecosystem services markets will increase the demand for trained scientists and professionals needed to verify outcomes and monitor progress of restoration work. Oregon’s information technology sector will be needed to provide the technical infrastructure for maintaining protocols, registering restoration and conservation projects, and tracking outcomes.

The examples in the *Markets in Practice* section above demonstrate Oregon’s impressive start in this emerging marketplace. They also highlight the need for continued focus on how to make such markets and payments more effective through on-the-ground restoration work, and how to harness their economic potential for the state, particularly in rural areas where jobs are needed. The integrated policy proposals that follow later in this document address these ecological and economic goals, and offer a starting point from which to make incremental progress.

## Ecosystem Services and Oregon Law

The concept of ecosystem services and markets has been recognized in Oregon law since the Legislature approved House Bill 2293 in 2007. The bill states that these benefits come from the conservation, management and restoration of ecosystems generally, and that the protection of these environmental benefits in Oregon is intended to result in improvements to the region’s economy, the rural resource base, and our quality of life.

The Senate Bill 513 was signed into law on July 23, 2009 with bipartisan sponsorship and support. The bill defines an ecosystem services market as “a system in which providers of ecosystem services can access financing to protect, restore and maintain ecological values, including the full spectrum of regulatory, quasi-regulatory and voluntary markets.” It establishes a policy in Oregon to “support the maintenance, enhancement and restoration of ecosystem services throughout Oregon, focusing on the protection of land, water, air, soil and native flora and fauna” and explicitly encourages state agencies to “adopt and incorporate adaptive management mechanisms in their programs in order to support the maintenance, restoration, and enhancement of ecosystem services.” “Adaptive management mechanisms” are defined by SB 513

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<sup>4</sup>Mosely, C. and M. Nielsen-Pincus. 2009. Economic Impact and Job Creation from Forest and Watershed Restoration: A Preliminary Assessment. Ecosystem Workforce Program, Briefing Paper #14, University of Oregon.

as “the processes of implementing programs in a scientifically based, systematically structured approach that tests and monitors assumptions and predictions in management activities and then uses the resulting information to improve programs and management activities.” Hence, SB 513 gives broad license and great flexibility to state agencies to embrace and implement ecosystem services market approaches.

The law formally recognizes that maintaining sustainable rural landscapes is important to Oregonians, and that landowners need assistance to maintain ecological values on the land now and for future generations. It also acknowledges the need to restore some of Oregon’s ecosystems, especially in the face of climate change. The law maintains that, with appropriate oversight, ecosystem services markets can save money, lead to more efficient, innovative and effective restoration actions than purely regulatory approaches, and facilitate pooling of public and private resources for conservation and restoration. It recognizes the potential economic benefits of directing development to less ecologically-sensitive areas and providing options for developers that enhance both economic and ecological outcomes.

The law encourages state agencies to use ecosystem services markets to address mitigation needs, after carefully avoiding impacts to the most sensitive areas and minimizing damage to others. The law explicitly requires that agencies “consider mitigation strategies that recognize the need for biological connectivity and the overall ecological viability of restoration at landscape scale rather than exercise an automatic preference for on-site, in-kind mitigation.” This approach is consistent with the 2008 federal compensatory mitigation rule issued by the U.S. Army Corps of Engineers and the Environmental Protection Agency, which gives preference to mitigation banks and in-lieu fee programs because they generally are more successful and sustainable than on-site, in-kind mitigation. Again, Senate Bill 513 explicitly directs state agencies to consider how ecosystem services markets can complement the existing natural resource management tools employed by the state.



*Bruce Taylor, Defenders of Wildlife*

Finally, the bill provides a framework and process for stakeholders and legislators to work together to develop a strategy for implementing integrated ecosystem services markets in Oregon. The purpose of this report is to articulate the findings and policy proposals developed by this collaborative process. The following pages include recommended strategies and actions for developing market-based approaches. The proposals recommended include both administrative and legislative options for action and highlight opportunities. The report acknowledges the challenging fiscal environment facing Oregon at the onset of the 2011 Legislative Assembly by recommending near-term implementation actions (e.g., proposed actions that could be taken during 2011 Legislative session) that would have little to no fiscal impact. Longer term strategies and proposals also are included to underscore that development of integrated ecosystem services markets will require focus and energy over several years. Although Oregon is in the relatively early stages of market development, the implementation actions proposed will ensure a strong foundation is laid, using lessons learned from testing and experimentation of ecosystem services markets.

### III. The Senate Bill 513 Process

SB 513 directed the Oregon Sustainability Board to convene an Ecosystem Services Markets Working Group (Working Group) to prepare a report and policy recommendations for the 2011 Oregon Legislative Assembly, and named the Oregon Watershed Enhancement Board (OWEB) to provide staff support to this group. OWEB also convened an Ad Hoc Group to advise and help frame policy issues under consideration by the Working Group. (For details about the Working Group process, see the appendix.) In November 2010, the Sustainability Board reviewed and approved the final report and policy proposals of the SB 513 Working Group.

The Working Group's charge was to create a framework for integrated ecosystem services markets in Oregon that produce positive ecological and economic outcomes. The group was to address several specific issues:



- a) Study and propose overarching goals to guide the development of integrated ecosystem services markets in Oregon that are efficient, coordinated and designed to produce positive ecological and economic outcomes with reasonable administrative costs to all participants;
- b) Identify entities that would be most appropriate to guide, facilitate and implement an ecosystem services market in Oregon;
- c) Address the need for a consistent methodology to describe and quantify ecological values and in so doing consider methodologies that have been developed or are in the process of being developed;
- d) Make recommendations concerning the development of appropriate ecological evaluation and accounting systems;
- e) Consider the appropriate role of government participation in ecosystem services markets to ensure that the activities of state agencies are well-coordinated and maintain a positive influence in maximizing ecological, social and economic benefits for the public and private sectors; and
- f) Propose potential policies to help stimulate demand for payments for ecosystem services, in particular the development of regulatory and voluntary ecosystem services markets.

## IV. Vision and Guiding Principles for Ecosystem Services and Markets in Oregon

### Vision Statement For the Marketplace

By 2020, Oregonians' land use and natural resource decisions are built upon an understanding of all of the goods and services ecosystems provide, and Oregon's strong land stewardship ethic is reflected in programs and policies that enable multiple types of payments for ecosystem services, including a vibrant, credible and efficient marketplace.

### Guiding Principles for an Ecosystem Marketplace in Oregon

- Payments for ecosystem services need to be designed intentionally to enhance quality of life for Oregonians. Effectively balancing ecological, economic, and community needs and goals can strengthen Oregon's reputation as a state that has embraced and defined sustainable living. It should be noted that payments for ecosystem services can take many forms, of which a viable credit market is just one.
- Many payments for ecosystem services are already in place and should be further supported by policies that expedite transactions and reduce costs.
- A fully developed ecosystem services marketplace needs many interacting components that integrate social, ecological, economic, and technical sectors to be viable and sustainable. Desired outcomes include:
  - a) A clearly-defined government role that is appropriately balanced with the role of the private sector;
  - b) Substantial investment of public and private funds in Oregon's lands and communities and in environmentally friendly technologies;
  - c) Opportunity for added economic return to existing or improved agricultural and forest operations;
  - d) Retention and expansion of family-wage jobs while increasing the pace of ecosystem restoration and conservation;
  - e) A strengthened relationship between buyers and sellers of ecosystem services, including mutual assurances from regulators and permittees;
  - f) Addition of value to other conservation strategies and programs to support the resilience of landscapes that are managed for a variety of purposes;
  - g) Strategic, coordinated investment that produces more robust ecological benefits by integrating the benefits where possible to address multiple ecological values, and a net measurable positive trend in species and ecosystem recovery; and
  - h) Simple, fair, and transparent structure, including a functional trading system with national standards, a ratings system that projects return on investments and ecological impacts, and efficiently operating system with low transaction costs.

## V. Policy Proposals

The policy proposals a) Address issues that would pose ongoing obstacles to development of ecosystem services markets, b) Provide encouragement or incentives for public- and private-sector participants to engage in an ecosystem marketplace, and c) Test and refine ecosystem services concepts, stimulate demand for ecosystem services credits and provide a forum for resolution of future issues related to an integrated ecosystem marketplace in Oregon. Many of these can be accomplished without legislative action; areas requiring statutory change or authorities are explicitly highlighted.

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**Issue: Better alignment and coordination of agency mandates and conservation and restoration priorities statewide.**

Collectively, the state's conservation and restoration strategies and plans call for a range of actions covering myriad fish and wildlife species and their habitats, with substantial overlap and some potential conflicts. For example, agencies sometimes disagree on when avoidance of impacts to priority habitats is necessary, as opposed to minimization or mitigation for impacts. Integration of the various conservation and restoration strategies and plans will allow more strategic resource investments and better coordinated restoration and conservation goals with long-term ecological benefits.

**Policy Proposal #1: Ensure conservation and restoration goals are integrated across state agencies to focus state investments and priorities.**

**Implementation**

*Step 1:* The state natural resource agencies should review the state's various conservation and restoration plans and establish a shared list of high-level priorities to focus state investments in conservation and restoration. This analysis would build upon an existing process already underway by the Oregon Watershed Enhancement Board, the Oregon Department of Fish and Wildlife, and the Oregon Department of Environmental Quality. It will result in high-level shared conservation

**Examples and Models – Proposal #1**

Shared goals would allow the state to encourage investment in high-priority conservation and restoration actions or areas. For example, agencies could define the criteria by which preservation of important habitats or natural places would be allowed in ecosystem services markets, thus enabling protection of such areas through compliance markets. Another example of facilitating investment in these shared conservation goals is encouraging early action for mitigation if a transportation agency, municipal wastewater utility, or other development interest invests in restoration well in advance of any impacts. In such cases, incentives such as better trading ratios for ecosystem services credits could be applied. Incentives also would include documented assurances from agencies that early action—with appropriately documented baseline conditions and performance monitoring—can be used for mitigation needs in the future.

An example of the twofold ecological and economic benefits of proactive investment in shared conservation goals comes from the Oregon Department of Transportation's (ODOT's) Bridge Delivery Program. To complete the necessary upgrades and repairs to 300 bridges in eight years, ODOT developed a comprehensive mitigation banking program that developed environmental performance standards for addressing species, habitat, and water quality issues. An independent evaluation of the Bridge Delivery Program concluded that ODOT's use of wetlands and habitat banks and outcome-based performance led to a 3:1 dollar return on investment for the programmatic permitting process, in addition to improved environmental outcomes. This compares with a 0.75:1 return on a traditional permitting approach. The results clearly showed that a programmatic approach to permitting a large program has significant cost savings (measured in staff time and money) over a project by project permitting effort.

and restoration goals, with the understanding that each agency will maintain their own, more specific detailed planning documents to address agency mandates.

*Step 2:* The state should develop an ongoing process and approach to address emerging conservation and restoration issues.

*Step 3:* The state should utilize conservation and restoration priorities to reconcile conflicting mandates where appropriate while ensuring state-level checks and balances are kept in place, and identify a process by which the shared high-level conservation and restoration goals will be recognized by regulating agencies. This step may include the need for some convening mechanism among state agency boards and commissions, along with federal regulating agencies, to obtain the necessary support for these shared conservation goals and priorities.



### ***Rationale***

With shared statewide conservation and restoration goals across agencies and resources, ecosystem service payments and incentives can be targeted toward the highest priority areas and projects that:

1. Are consistent with credible landscape scale conservation plans;
2. Are of sufficient size, configuration and legal status to be viable long-term and address long term stewardship;
3. Address multiple values, especially resilience in the face of climate change, water quantity and quality, carbon sequestration and biodiversity;
4. Protect high quality, functioning ecosystems first, then restoration where most likely to be successful;
5. Allow flexibility in service area designation to ensure that mitigation projects have significant ecological benefits and are cost effective;
6. Provide revenue to private landowners who voluntarily implement conservation measures on their property;
7. Are relatively low cost for a given outcome compared to other options.

This approach will require objective criteria for prioritizing lands within an area of geographic interest, and performance standards to ensure ecological targets are met.

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### **Issue: Statutory impediments to the use of ecosystem services market approaches.**

Statutory impediments exist that limit the ability of agencies and governments to apply ecosystem services approaches as part of their business processes. Some state agency missions do not address the protection of ecological values, for example, while others could actually purchase land to protect such assets as rare, high-quality oak woodlands in the Willamette Valley. For agencies that must consider financial benefits from the sale of such properties, adding ecosystem service values to the mix could change outcomes.

Additionally, some agencies have policy guidance that limits the use of mitigation related funding as one of several fund sources that could be used to develop a large-scale restoration or conservation project. These examples illustrate that natural resource management policies were developed over many decades and may not account for ecosystem services and/or market-based approaches. For this reason, a retrospective look at agency and government policies and statutes is needed.

**Policy Proposal #2:** Continue to identify and address statutory and administrative impediments to state agencies' and local governments' ability to employ ecosystem market approaches and tools.

### ***Implementation***

*Step 1:* State agencies and local governments will work together to identify statutory limitations to the use of ecosystem markets to protect and restore ecosystems.

*Step 2:* Agencies and governments will assess whether and how ecosystem market approaches can enable state agencies and local governments to more efficiently and effectively achieve their missions.

*Step 3:* Agencies and governments will identify existing programs that could be easily modified or expanded to include ecosystem market approaches.

### ***Rationale***

This policy proposal recommends a review of agency and local government statutes associated with existing environmental regulations with the intent of identifying areas of opportunities for using ecosystem services payments or market approaches as an alternative to traditional compliance mechanisms or to enhance existing incentives programs. This review also would identify examples of agencies already using ecosystem services approaches that could be used as

#### **Examples and Models – Proposal #2**

The Oregon Department of Environmental Quality (DEQ) developed guidance to implement water quality “trades” in National Pollutant Discharge Elimination System permits (see Case Study #2 in Appendix C for more information). DEQ also intends to evaluate the use of ecosystem metrics in its Clean Water State Revolving Fund Loan Program, which provides low-cost loans for water pollution control activities and green projects (e.g., energy and water efficiency, green infrastructure). This loan program ranks projects based on anticipated water quality or public health benefits, but could use more explicit metrics to simplify project evaluation. In addition, DEQ will consider revisions to its enforcement policy on supplemental environmental projects to allow violators to use ecosystem service markets when settling DEQ penalties. By taking these steps, DEQ is demonstrating its support of ecosystem service metrics and markets. Existing programs that could serve as models for other agencies and governments as they consider how to incorporate ecosystem services market approaches into their processes include current “in lieu” mitigation programs—such as the Department of State Lands’ in-lieu fee program in conjunction with the U.S. Army Corps of Engineers and the agency’s payment-in-lieu program for wetland mitigation, the carbon offset authorities of the Oregon Department of Forestry’s Forest Resource Trust, and The Climate Trust. These programs define a monetary path for environmental compliance. Oregon’s Public Lands Advisory Committee could provide a forum for considering use of ecosystem services valuation tools as part of the process to determine “value” of state-managed lands. The valuation framework in development by the U.S. Forest Service could be a model for the state to use for:

- Describing the ecosystem services provided by state lands;
- Examining potential outcomes and tradeoffs among ecosystem services associated with proposed management activities;
- Assessing the relationship between supply and demand for ecosystem services and strategies for protecting and maintaining such services through time;
- Working with the stakeholders to identify the services they value; and
- Making management decisions that consider the suite of ecosystem services provided by state lands which are in the public trust.

models by others. The SB 513 Working Group began the process to identify and propose solutions for these impediments and offers a starting point from which to build.

Those agencies and governments which manage public lands must have the necessary methodologies and tools to quantify and assess the value of ecosystem services on public lands (see Policy Proposal #3). The U.S. Forest Service—specifically, the Deschutes National Forest and the Pacific Northwest Research Station—is developing a framework for describing forest values provided by federal lands to account for the full range of ecosystem services, ranging from timber and clean water to cultural assets to climate regulation through carbon sequestration. This framework could be of great value to Oregon’s efforts.

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**Issue: Oregon standard operating procedures for generating credits.**

In order for markets to operate effectively, they must be transparent, accountable, and consistent so both buyers and sellers have assurances about what is being bought and sold. In the case of payments for ecosystem services or ecosystem markets that utilize public funds, the public also must be able to easily see the benefit of a purchase. However, statewide standard operating procedures for defining, approving, registering, and verifying ecosystem



credits and payments—especially for use in compliance markets—currently do not exist. In addition, those methods that are currently used to determine how ecological assets are valued tend to focus on a direct exchange of acres, rather than on a true recognition of the valuable services those acres provide as a part of a larger, functioning system. More standardized procedures would increase certainty and provide assurance for potential sellers (landowners of all kinds) and buyers.

**Policy Proposal #3:** Encourage public-private partnerships to develop standardized tools and processes for accounting and approving ecosystem credits and payments.

**Implementation**

*Step 1:* To achieve this, the state should engage natural resource agencies, governments, conservation organizations, private landowners and businesses to develop an integrated ecosystem assessment methodology and an integrated crediting protocol, building on high-quality tools where appropriate.

*Step 2:* In addition, local, state, tribal and federal agencies should provide public lands on which to test or pilot use of measurement and crediting tools and processes.

### ***Rationale***

The SB 513 process established several characteristics that should be incorporated into an *ecosystem assessment methodology* using standardized criteria to measure ecosystem services:

1. Multi-scaled, applicable to landscape scale and site level assessments;
2. Addresses context (relative value within broader ecosystem);
3. Applicable to all land and water types;
4. Quantifies both individual and collective ecosystem services, such as water quality, carbon and biodiversity functions and values;
5. Easily applied with low transaction costs;
6. Incorporates best available ecological information;
7. Compatible with existing methodologies where appropriate;
8. Transparent and repeatable;
9. Balances practicality and cost with precision/credibility;
10. Ability to quantify individual ecological values and generate an overall ecosystem integrity score comprising individual ecological values;
11. Informs monitoring of cumulative effects and overall program effectiveness; measures change through time, both positive and negative;
12. Hierarchical, with tiered degrees of measurement rigor, to allow use in the full range of compliance and voluntary markets and incentives programs, for different degrees of measurement rigor; and
13. Posted in the public domain for use by anyone without charge.

#### **Measurement Tools for the Full Spectrum of Payments for Ecosystem Services**

Tool development for regulatory and voluntary markets require varying levels of detail, from greatest on the regulatory end, where field visits are typically required, to least on the voluntary end, where spatial data may be sufficient. For meaningful ecological restoration, the entire spectrum needs to produce credible measurement of ecosystem service production and improvement, but there will be a range of different standards requirements.

For example, the notion of voluntary markets concerns self-organized individual transactions. Such trades may be negotiated business-to-business or business-to-community and do not generally involve government entities or oversight. Examples range from the Perrier-Vittel Water Company in France financing reforestation and working with farmers to develop modern, less polluting facilities in order to ensure clean water sources, to public utilities encouraging their customers to pay voluntary fees that underwrite ecosystem services improvement by land-owners in their source water areas. For these kinds of “trades,” tools based on remotely-sensed spatial data would likely be sufficient to address measurement needs.

Under regulatory trading schemes, heavily regulated industries can trade credits below a predetermined cap. A strong regulatory system with enforcement capacity must exist for this system to operate. California’s mitigation banking programs that restore wetlands and other natural resource areas provide one example. Other examples include water temperature and nitrogen trading, which must qualify under very specific field-based measurement systems.

A subgroup evaluation of a small number of relevant existing ecosystem assessment methodologies found that none currently addresses the full range of necessary characteristics, although two tools—the Willamette Partnership’s Counting on the Environment methodologies and EcoMetrix—are headed in the right direction (see appendix).

Characteristics for a general *crediting protocol*—which is especially critical for compliance markets—were also established as part of the SB 513 process:

1. Uses consistent, agreed-upon methodology to quantify the functions and values of ecosystem services as identified in 1-13 above;
2. Clearly describes the steps necessary to generate credits/and or payments associated with programs that provide payments for ecosystem services, voluntary markets, and compliance markets, with assurances that the necessary policy and/or program requirements are met and that transaction costs are appropriate relative to the anticipated revenue from different programs;
3. Provides electronic access to information about transactions; and
4. Recommends use of a centralized data management system to register and track ecosystem benefits (the centralized system would be agreed upon by agencies and have reasonable transaction costs).

An *ecosystem assessment methodology* and a *general crediting protocol* should be developed simultaneously with input from federal, tribal, state, and local governments, private-sector interests, and nonprofit stakeholders.

It is important to understand that third parties play an important role in the delivery of market-based and other ecosystem services incentive programs. As government budgets become constrained, the role of third parties contributes to potential job growth in verifying ecosystem benefits, designing and operating market infrastructure, and developing tools to help landowners access new ecosystem payments.

Third parties can serve as aggregators of multiple small projects; through

aggregation, such projects achieve ecological benefits while reducing costs in a way that ensures they are viable in the marketplace. Third parties offer existing infrastructure, such as verification and certification methodologies, that will increase efficiencies and reduce costs during development of ecosystem services markets. Trained third parties can conduct site assessments to quantify ecological functions and values for the purpose of generating ecosystem service credits to sell to public or private buyers. To help ensure the legitimacy of a crediting system, agencies should accept monitoring reports verified by an accredited third party as evidence projects are meeting performance standards and eligible for credits of any kind along the spectrum.



*Dave Bickford*

Given that many regulators are federal, there is a clear need to pursue collaborative tool development across jurisdictions. Many of the foundational pieces—agreed-upon concepts, pilot tools, nascent and thriving partnerships, potential for federal funding—are already in place to build such collaboration.

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**Issue: State purchase of ecosystem credits and a focus on achieving ecological outcomes.**

Ideally, agencies and governments could purchase ecosystem services credits that emphasize ecological outcomes to either meet mitigation requirements or achieve their missions. One way is through purchasing of credits by a grant program. Yet while many agencies may have this ability, clear direction and clarifying authority is lacking regarding appropriate roles for government.

**Policy Proposal #4:** Provide authority and direction to state agencies and encourage local governments to purchase credits and further invest in ecological outcomes that are consistent with state conservation and restoration goals.

***Implementation***

*Step 1:* The Legislature should provide clear authority that state agencies may purchase credits as part of meeting their goals in current grant, incentive, and other programs, and encourage local governments to do the same. Purchasing ecosystem services credits may be done as part of the routine business of many agencies as they work to achieve their mandated goals.

In the future, the state should take additional steps to stimulate demand for ecosystem services credits by such actions as:

- Buying credits to create a reserve pool of credits to manage the programmatic risk tied to an ecosystem market, and
- More clearly defining in state agency contracts and award agreements who owns ecosystem services credits and the circumstances under which credits can be sold.

***Rationale***

Encouraging public agencies and local governments to purchase ecosystem services credits and invest in ecological outcomes provides incentives for market-based approaches for ecosystem services. Ecosystem services markets encourage investment in ecological outcomes—such as recovery of ecosystems and lost habitat functions—and track performance toward such goals. This performance measurement ensures accountable and strategic state investments in restoration and conservation.



*Bruce Taylor, Defenders of Wildlife*

When purchasing ecosystem services credits, agencies and governments should adhere to the following guidelines:

1. The crediting process would use appropriate methods to measure ecosystem services to ensure the validity and quality of credits.

2. Agencies and governments purchasing credits to meet mitigation requirements should receive assurances from regulatory agencies of the sufficiency of these verified and registered credits (see Policy Proposal #3).

Given the option to purchase credits, state agencies would not need to operate brokerages for ecosystem services, act as verifiers, or otherwise develop market infrastructure unless: the services are not available from private providers; the services are available from the private sector, but at costs that are too high relative to ecological benefits; or agencies are explicitly authorized to do so. Agencies may, however, create credits for their own use—as in the case of the Oregon Department of Transportation—and potentially sell unused, surplus credits in the future (see Policy Proposal #5).

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**Issue: Sale of ecosystem services from public lands.**

Policies guiding the sale of ecosystem services from public lands are inconsistent and/or absent. Concern about such sales swamping the market, particularly at the federal level, is still strong, but should not be allowed to deter sales of credits from public lands where the public benefits are clear.

**Policy Proposal #5: Allow state agencies and local governments to sell credits under limited circumstances.**

***Implementation***

*Step 1:* The Legislature should provide clear authority that state agencies and local governments can sell ecosystem services credits under the conditions included in this policy proposal.

***Rationale***

Public lands have a role in markets, but credit sales from these should not be done in a way that nullifies or undermines sale of credits from private lands. Agencies and local governments should be able to sell credits from lands for which the government has a fiduciary responsibility to generate revenues to defined beneficiaries. In the case of state agencies, sale of ecosystem service credits should be possible if:

1. Credits are sold at the full and fair market rate;
2. Agencies are using commonly used and approved standards and are held to the same eligibility requirements, performance standards, and legal requirements as required for the private sector; and
3. With selling credits, the conservation purpose and mandates of the government land will be left unmet due to lack of appropriated funding.

The aforementioned conditions do not limit the ability of a state agency or local government to create and use ecosystem services credits to meet regulatory obligations or for another purpose, such as meeting the agency's mission (as noted in Policy Proposal #4). State agencies can partner with other governmental, non-profit, or private entities to create and use ecosystem credits.

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**Issue: Adaptive management and evaluation of ecosystem services approaches.**

In carrying out their responsibilities, state and local governments make decisions that can affect the ability of ecosystems to provide critical services. However, because the concept of ecosystem services is relatively new, the effects of natural-resource decisions on ecosystem services have not been monitored and evaluated to inform future decisions.

The term “adaptive management” is used to describe a structured process for evaluating the results of policies, programs and management actions, and using that feedback to improve future decision-making. Senate Bill 513 already has encouraged state agencies to adopt and incorporate adaptive management mechanisms into their programs to support the maintenance, restoration and enhancement of ecosystem services (see ‘Ecosystem Services and Oregon Law’ earlier in this document). It is important to apply the concept of adaptive management to natural resource policies as well, to make sure they are working effectively and producing desired results.

Policies and management should be informed by evaluation, research, and monitoring. These evaluations should be designed to address effects at multiple geographic scales in a way that informs strategic and appropriate management actions in the future. Such work also contributes broader understanding of the cumulative effects of current and future restoration.

**Policy Proposal #6:** Use an adaptive management framework to consistently and collaboratively evaluate ecosystem services approaches.

***Implementation***

*Step 1:* The state should establish a system to evaluate the effectiveness of ecosystem services programs and other ecological and environmental investments at appropriate scales by:

- Coordinating efforts and resources to provide the support necessary to conduct research, effectiveness monitoring, and evaluation;
- Identifying an entity responsible for the integrated tracking and reporting of the status and outcomes of restoration, conservation, and mitigation programs across jurisdictional boundaries in Oregon; and
- Ensuring results of tracking inform natural resource policies and management through time.

***Rationale***

A consistent, collaborative effort to track the effectiveness of cumulative effects and impacts—both positive and negative—of conservation and restoration programs across programmatic boundaries would help inform and improve decision-making. As is the case with all natural resource management programs, evaluation will be important for new and experimental programs such as ecosystem services payments and markets.

Collaboration among agencies and organizations working on ecosystem service programs is critical to learn from early implementation and adapt policies and management based on new knowledge (see Policy Proposal #7).

Research, effectiveness monitoring, and evaluation of implemented management practices is needed to track changes through time and at both project and landscape levels. This collaborative

evaluation also will assess cumulative effects and overall effectiveness of ecosystem service approaches. Evaluation programs should be designed to ensure that the ecosystem services credit generated by the implemented activity is achieving the intended conservation, restoration and/or mitigation purpose. Funding for research and effectiveness monitoring is a shared responsibility and should not be borne solely by the project developer or entity holding the mitigation responsibility.

It will be critical to institutionalize the collection and analysis of relevant data about the effectiveness of ecosystem services approaches. Effectiveness monitoring should be tied directly to performance measures to understand what is being achieved by restoration and conservation efforts. Integrating priority conservation goals (Policy Proposal #1) and developing standard operating procedures (Policy Proposal #3) will support this goal.



*Courtesy of Oregon's Living Landscape, Defenders of Wildlife*

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**Issue: Natural versus engineered infrastructure.**

“Natural infrastructure,” such as conservation and restoration projects to protect and enhance ecosystem services, may provide a wider range of ecological benefits at lower cost than traditional “hard” engineering projects. Examples include:

- Shading streams by tree planting rather than building cooling towers to meet water temperature standards;
- Restoring wetlands to enhance flood storage and stormwater management rather than building dams and water treatment facilities;
- Encouraging the presence of beavers in locations where their dam construction provides helpful ecosystem services such as water retention; and
- Rewarding sustainable land-management practices as part of a public utility’s source water protection program to prevent the contamination of drinking water supplies rather than building water treatment facilities.

**Policy Proposal #7:** Encourage state and local governments to cost, compare, and consider natural infrastructure as an alternative to hard engineering for new development projects and mitigation.

***Implementation***

*Step 1:* The state should use existing technical guidance as templates to build guidelines for agencies, local jurisdictions and others about the use of natural infrastructure in new development projects (e.g., road facilities, water storage, water treatment, public buildings) and mitigation.

### Examples and Models – Proposal #7

The Roseburg Urban Sanitary Authority is required by Oregon Department of Environmental Quality to reduce temperature and nutrient discharges associated with its wastewater treatment facility into the Umpqua River. Rather than expanding their engineered solution to this problem, the Sanitary Authority purchased a 300-acre property adjacent to the facility and is developing a natural engineering solution that used wetlands and riparian areas for additional filtration of wastewater.

Another example involves the use of low-impact development for stormwater treatment by the Oregon Department of Transportation (ODOT). This approach works well where ODOT has sufficient right of way to infiltrate the water using such natural means as bioswales, but is not possible in heavily developed urban environments where the department has very limited right of way. However, where appropriate, such approaches have the potential for both ecological and community benefits, and may begin changing historical approaches to land-use planning, urban and rural development, and long-term capital financing. ODOT itself has developed the following steps for considering where the use of natural infrastructure, which can save time, money, and impacts, is appropriate:

- o Develop a comprehensive understanding of the resources within a project area and make that information available to design teams early in the project to ensure maximum avoidance from the outset.
- o Work with the resource agencies early and often to understand what critical aspects need to be maintained from a natural resource perspective (e.g., bridge piers in the water are not necessarily a problem for fish, but approach fills into the active flood plain to reduce bridge costs can have negative consequences with regard to hydraulics).
- o Recognize and respect all agencies' missions and strive for the success of all. Project development and natural resources protection does not need to be an either/or proposition, but success depends upon early communication and mutual cooperation and innovative natural-infrastructure approaches.
- o Long-term, big-picture thinking is key. Creation of several small, low-function wetland mitigation sites takes a lot of time and money, and extends a project's critical path with very low ecological benefits. However, creating an extensive mitigation bank provides multiple ecological benefits, removes mitigation off the critical path, and tends to be a cost-effective approach.

*Step 2:* The state should evaluate documented decision-making rationale (e.g., cost-benefit analyses of natural versus engineered infrastructure) to determine where natural infrastructure may be most appropriately used.

#### ***Rationale***

Funding agencies should encourage applicants to compare the costs and benefits of proposed hard engineering/infrastructure projects with options that substitute natural infrastructure to maintain or restore ecosystem service functions. A provision encouraging the use of natural infrastructure as an alternative would be especially useful for large projects (including mitigation) that have the potential to result in positive, large-scale ecological benefits.

Given the relative newness of natural infrastructure as an alternative to engineered solutions, it is important that natural infrastructure be evaluated to ensure mitigation objectives are being met by the natural infrastructure alternative and to quantify the range of ecosystem services benefits that emerge from such projects. Natural infrastructure approaches then can be managed adaptively based on findings from such monitoring (see Policy Proposal #6).

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#### **Issue: Land-use decisions that enhance ecosystem services.**

Decision-making about land use currently does not include the full spectrum of existing ecosystem services, potentially limiting the perpetuation and/or enhancement of these services for present and future generations. For example, industrial use areas historically were sited in wetlands as part of Oregon's zoning process over three decades ago. These previous decisions now are resulting in serious challenges to developing areas for industrial use due to the difficulty in finding suitable wetland mitigation options for

addressing impacts. Updates to Oregon’s land-use laws and plans could benefit by including consideration of ecosystem service values, which integrate ecological and economic considerations.

**Policy Proposal #8:** Encourage state and local governments to make policy-level land use and development decisions that fully consider the services that ecosystems provide at an ecologically appropriate scale.

**Implementation**

*Step 1:* As funds are available, the state should work with public- and private-sector entities to develop GIS tools to estimate ecosystem service values to inform land-use planning in Oregon.

**Examples and Models – Proposal #8**

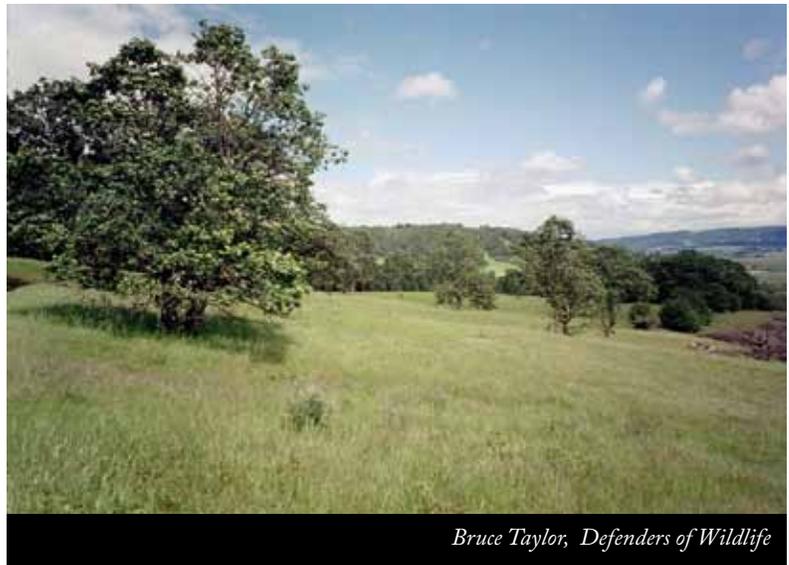
One example is offered by the City of Damascus, which has developed a natural resources inventory based on the provisioning of ecosystem services and is exploring options about how this inventory can inform development, infrastructure, and other land-use decisions facing the city.

Similarly, in developing the West Eugene Wetlands Plan in the 1990s, the City of Eugene used wildlife habitat, stormwater, and recreational use inventories to update their Metropolitan Plan.

*Step 2:* As funds are available, the Departments of Land Conservation and Development and Environmental Quality, along with other state agencies, should work with the public- and private-sectors to develop guidance for local, state, and federal land-use planners about how to evaluate the effects of land-use decisions on critical ecosystem services. Guidance should also include how to consider ecosystem services in critical areas ordinances, urban growth boundary designations, and other land-use planning documents. Such guidance would help inform strategies for climate change adaptation, including how water resources and community water supplies may be impacted by climate-driven changes in water regimes.

**Rationale**

In the future, ecosystem services should be considered in land-use planning decisions, such as amendments to local comprehensive plans, designations of Urban Growth Boundary changes, and other processes. Under Goal 5 of the current land-use planning system, local



*Bruce Taylor, Defenders of Wildlife*

governments inventory and evaluate their natural resources, including but not limited to wetlands, trees and native vegetation, wildlife habitat, and groundwater resources. As part of this process, local governments request current information about these resources from state and federal resource management agencies. If assessments of ecosystem services were completed by the state in the future, this information could be made available to help inform land-use decisions at the local scale in a way that ensures development of livable communities throughout Oregon.

State and local governments should be encouraged to increase public understanding of how land-use decisions impact the quantity and quality of ecosystem services. Governments should collaborate with other agencies and partners to identify ecosystem services within their jurisdictions and, as necessary and appropriate, quantify ecosystem services at watershed scales. As noted in Policy Proposal #3, methodologies and tools to quantify and assess the value of ecosystem services should be applied during the development of comprehensive land-use plans as a means to examine potential outcomes and impacts associated with different decisions. Potential trade-offs among ecosystem services will be identified so that future land-use decisions can consider these trade-offs and pursue actions to reduce or eliminate them with the intent of ensuring long-term maintenance of ecosystem services. These methodologies and tools also can provide planners, developers and citizens with improved certainty about environmental impacts associated with land-use decisions. Ultimately, such information will expand knowledge on how land use affects an ecosystem's capacity to provide these essential services. It has been found in other settings that local land-use projections should be required components of ecosystem restoration site plans, and state environmental management agencies' watershed plans should reflect urban development patterns.<sup>5</sup> Understanding the potential impacts on ecosystem services will help decision-makers weigh multiple goals before making decisions.

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**Issue: Testing innovative ecosystem services market approaches.**

Interest in payments for ecosystem services has expanded dramatically worldwide in recent years, and a variety of payment approaches has been put in place across multiple settings. While payments for ecosystem services are not new, opportunities exist to better study how markets function and the long-term implications of the marketplace. As with any new technology or social development, a degree of openness to innovation and risk-taking in the early stages is essential to achieve progress. Oregon is regarded as a leader in developing the broader ecosystem services marketplace and should encourage actions such as:

- Experimenting with market-based approaches;
- Building case studies;
- Gathering data about ecological and economic outcomes of ecosystem services projects;
- Identifying employment and development opportunities from such projects; and
- Using lessons learned from pilot efforts to refine market approaches.

**Policy Proposal #9:** Provide a testing ground and stimulate demand for payments for ecosystem services.

***Implementation***

Pilot projects in various stages of development include:

*1. Public-private partnerships to stimulate demand for payments for ecosystem services.*

One pilot project that is in development involves the Willamette Partnership, The Freshwater Trust, and the Oregon Watershed Enhancement Board (OWEB) taking the lead in stimulating and enhancing markets for ecosystem services for watershed restoration actions.

- Private funding to support development and implementation of restoration will be secured by The Freshwater Trust.

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<sup>5</sup> BenDor, Todd K. and Doyle, Martin W.(2010) 'Planning for Ecosystem Service Markets', Journal of the American Planning Association, 76: 1, 59 — 72, First published on: 09 December 2009 (iFirst)

- Restoration projects will be implemented by watershed councils in strategic model watersheds.
- Ecosystem services credits emerging from these projects will be certified and verified by the councils and Bonneville Environmental Foundation as part of the model watershed work with OWEB and Meyer Memorial Trust, and the credits will be made available for sale in an ecosystem marketplace by the Willamette Partnership. OWEB tentatively has allocated funds dedicated to the purchase of completed and verified restoration projects as an option if the private investors who provided initial funding decide to no longer pursue the sale of credits on the market. The pilot project will test the potential for ecosystem services markets to attract private funding for restoration. If successful, the approach would stimulate private investment in restoration and conservation and ensure that restoration outcomes emerging from projects can be quantified. This pilot effort is intended to reduce risk and help establish the market.

2. *Coordination with existing initiatives focused on conservation of sagebrush habitat to test ecosystem service market concepts, methodologies, and processes.*

Resource management and policy issues in Oregon’s sagebrush country may present opportunities for projects that serve as “proofs of concept” of ecosystems services markets approaches and as a laboratory to inform associated program and policy development. These potential opportunities are focused primarily on renewable energy (especially wind) and transmission line development, effects to sage grouse, and several associated collaborative conservation initiatives.

The Renewable Energy & Eastern Oregon Conservation Partnership (also known as the Sagebrush Conservation Partnership<sup>6</sup>) provides a forum for addressing sagebrush ecosystem management and policy issues, including renewable energy development, in the state. This program may offer an opportunity to explore how market-based tools, including voluntary, pre-compliance, and compliance approaches, can be utilized to protect important habitat and resources in eastern Oregon. A sagebrush pilot project could work to improve coordination among agencies to identify high-priority habitats, provide clarity to developers regarding potential mitigation needs, and ensure strategic investment in appropriately



*Photo by Shutterstock, Courtesy of Defenders of Wildlife*

placed restoration and conservation projects. Market-based tools such as credit trading, incentive payments, and easement and acquisition purchases, along with regulatory streamlining and certainty, may be important components.

<sup>6</sup>The Sagebrush Conservation Partnership was convened by the Governor’s Office and the BLM Oregon State Office as a project of the Oregon Solutions program and has been tasked with establishing “an on-going collaborative action strategy to address the needs and issues inherent to both renewable energy and habitat conservation and restoration in Eastern Oregon.” Significant focus for the program is on wind energy development and sage grouse conservation.

3. *A dialogue to collect input and ideas from Oregon's business community to explore how voluntary ecosystem services markets could help showcase their environmental stewardship in an economically beneficial way.*

Government and private-sector direct purchase of ecosystem services could provide an effective tool for transitioning toward market-based programs through the expansion of the voluntary market. In Oregon, there already is an active voluntary carbon market and a growing water restoration marketplace. Several Oregon-based certification programs exist now, and provide businesses with various opportunities to measure their environmental impacts.

Nationally and around the world, many large companies now are completing corporate social responsibility reports using various standards and questionnaires related to environmental impacts (e.g., the Greenhouse Gas Protocol, the Carbon Disclosure Project). One reason for this is that investors and customers are demanding reliable carbon emission data. Regulators such as the Securities and Exchange Commission also are pushing for more accurate data. The calculation and reporting of carbon emissions today has become a standard, mainstream business process, with the majority of Fortune 500 companies now publicly reporting carbon emissions on their websites and/or through other third-party sources (e.g., The Climate Registry). In addition, a new study prepared for the Natural Resources Defense Council by Tetra Tech identifies the many places around the country that will experience water shortages in the coming years.<sup>7</sup> One-third of U.S. counties may find themselves at “high or extreme risk,” according to the report—including a portion of the Willamette Valley. For this reason, many corporations are starting to account for their water use. Many of the businesses completing this ecological accounting or “footprinting” are interested in either taking direct action (i.e., changes to business practices) to reduce their impacts or offsetting these impacts through the purchase of ecosystem services credits or other environmental investments.



*Bruce Taylor, Defenders of Wildlife*

Oregon should explore how voluntary ecosystem services markets could help the state's businesses showcase their environmental stewardship. The state would convene representatives from Oregon's business community to identify 1) private-sector needs for and interest in programs and projects that provide sources of ecological offsets and investment opportunities in environmental stewardship and 2) private-sector sources of offsets that are created when businesses go “above and beyond” normal business practices to generate more ecosystem services credits than are need to offset their footprint. Based on the outcome of this dialogue, the state could further the discussion

<sup>7</sup>Natural Resources Defense Council. Climate Change, Water, and Risk: Current Water Demands are Not Sustainable. Natural Resources. Water Facts, July 2010.

(e.g., meetings with existing certification programs to discuss current programs and gaps that may exist in the availability of carbon, water or other ecological credits) with the intent of facilitating public-private partnerships to help Oregon businesses achieve their goals of environmental stewardship.

### ***Rationale***

Pilot projects and related efforts will provide proof of concept for ecosystem service market approaches by allowing concepts, methodologies, and processes to be tested. Based on the lessons learned from such projects, approaches and tools can be refined and adapted to better meet the needs of buyers and sellers in the marketplace, and ensure that ecosystem services markets achieve both the ecological and economic goals for which they are intended. Such pilot projects could be carried out collaboratively, with involvement by local, state, tribal and federal governments, non-governmental organizations and private-sector participants.

In addition, such projects provide an opportunity for Oregon to seek national recognition and federal funding and serve as a location for pilot testing. For this reason, the state should work with federal entities such as the Office of Environmental Markets to seek status as a federal pilot location.

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### **Issue: Need for ongoing development of ecosystem services approaches.**

Market-based approaches to the maintenance and restoration of ecosystem services are rapidly developing, and ideas for institutionalizing and refining these approaches are evolving quickly. Continued attention to developing and implementing the appropriate infrastructure for ecosystem services markets will be critical to maintain Oregon's leadership role and make sure such markets work for Oregon.

**Policy Proposal #10:** Continue the dialogue with interested and affected parties to further facilitate development of ecosystem services and market approaches.

#### **The Need for Federal Action on Ecosystem Services Markets**

Oregon is a national leader in the development of ecosystem services market concepts and infrastructure, but cannot alone address these issues. Strong collaboration with federal partners, including the Council on Environmental Quality and the Office of Environmental Markets, will be needed to address the following issues:

- Work with federal agencies and Congress to authorize regional approaches to protecting and enhancing the full suite of ecosystem services.
- Coordinate identification of conservation priorities on federal lands.
- Seek insertion of ecosystem services market approaches and financial resources for these in the Farm Bill, climate-change legislation, and other appropriate federal legislation.
- Work iteratively with states to develop guidance on bundling and stacking of ecosystem services credits.
- Create consistent metrics for incentive programs and compliance markets related to federal programs and/or regulations.

For example, Congress could authorize an "alternative path" in selected regions (e.g., the Willamette Basin, Chesapeake Bay, or Great Lakes) where regulated parties could satisfy their obligations under the environmental statutes by investing in tangible ecological outcomes that are consistent with a regional strategy and provide multiple benefits. The incentive to participate in the program could be streamlined permitting and reduced administrative costs with improved results.

### ***Implementation***

*Step 1:* The Legislature should provide clear direction and/or authority for the Oregon Sustainability Board to create a forum for future discussions and deliberations about ecosystem services market issues, with staffing by the Oregon Watershed Enhancement Board. One possibility is to create a standing work group that interfaces with key natural resources boards and commissions. This group would help integrate the authorities of the various agencies, thus resulting in more effective and long-lasting policy.

### ***Rationale***

A broadly acceptable mechanism for convening experienced and engaged partners is needed to continue discussions around development of ecosystem services approaches and markets. Important lessons are rapidly being learned from pilot projects, and multiple policy issues and information needs will emerge as these tools continue to develop. A suite of initial policy issues—including unresolved issues remaining from the SB 513 process—that could be addressed by this collaborative entity include:

1. *Sale of ecosystem service credits off public lands (building on Policy Proposal #5).*
2. *Bundling and stacking of ecosystem service credits.* Restoration and conservation projects often produce ecosystem services that are not recognized or valued in current natural resource regulations. Landowners should be rewarded for protecting and restoring multiple values, rather than be forced to focus on a single attribute. Incentives are needed to reward credit sales that address multiple benefits, and could be achieved by developing an alternate path to approval for large, high quality, multi-credit projects that could go to an oversight entity for approval, using a single, integrated application process.

Stacking and bundling services can improve the integration of ecological values, providing a more holistic view of natural systems and allowing landowners to tap several sources of revenue. However, it should be noted that legal requirements for credits of any regulated resource basically define (and, in some cases, limit), the potential for bundling and stacking.



*Photo by Shutterstock, Courtesy of Defenders of Wildlife*

**Stacking** allows landowners to sell different types of credits from a single location or receive multiple revenue streams from the same action. For example, if a landowner restores an acre of riparian forest, it could produce water quality credits, carbon credits, riparian habitat credits, and conservation banking credits, more than one of which might be sold in the respective markets.

**Bundling** allows a landowner to combine multiple values from a piece of property under a single credit type. For example, wetlands represent the ultimate “bundled” credit, which addresses water quality, flood storage, groundwater recharge, habitat, and more, but under current rules a landowner could not sell credits for additional services such as carbon. In another example, restoring an acre of riparian forest results in improvements to more than one ecosystem service, but they will be defined as a single type of credit—riparian habitat—that could be sold on a voluntary or regulatory market.

3. *The need to aggregate multiple small projects to ensure they are ecologically and economically viable in the marketplace.*
4. *Protection of unregulated ecosystem services.* The range of impacts to ecological services is not always accounted for by regulations. In addition, little funding and low demand for some credits—such as biodiversity—may lead landowners to sacrifice one value for another (e.g., carbon offering higher monetary value than habitat). Policy options to address unevenly regulated resources would be developed and evaluated.
5. *Explore the development of ecosystem services districts.* Local governments and special districts could create pilot ecosystem services districts to test an alternative and innovative means of administering payments for ecosystem services.
6. *Risk management and future options for generating revenue for ecosystem services projects.* Buyers of ecosystem service credits do not want to have the long-term liability for the performance of the mitigation effort, particularly in case of failure or change in regulations.

## VI. APPENDIX A – Glossary of Terms

**Additionality:** The concept that calls for credited ecosystem improvements to represent an overall increase in, or avoided reduction of, ecosystem services, relative to those services that would have existed without creating the credits. Financial additionality refers to the ability to demonstrate that absent payments for credits the benefits of the action that generated the credits would not have exceeded the costs; therefore proving that the credits truly provided the financial incentive to undertake the action.

**Aggregator:** A person or institution that solicits, combines and/or markets ecosystem service credits from multiple sources on behalf of the credit owners. An aggregator facilitates financial transactions between the buyers and sellers of credits, and may charge a fee for the service, but is not directly involved in the chain of ownership of credits.

**Broker:** A licensed person or institution that buys and sells ecosystem service credits, or facilitates financial transactions between the buyers and sellers of credits. Brokers can be directly involved in the chain of ownership of credits.

**Cap and Trade:** A cap and trade system sets an aggregate cap on pollution or resource use. Tradable allowances (or permits) take the form of individual quota shares of the aggregate cap. These permits are assigned or auctioned to polluters or resource users who are then allowed to buy and sell allowances such that their actual pollution or resource uses is equal to or less than the allowances held. Cap and trade systems often have provisions for allowing participants and third parties to provide offsets to the market.

**Common currency market:** Allows for the generation and trade of a single, universal credit (such as an “ecosystem credit”) that captures the value of broad ecological functions and values, through an agreed upon accounting tool, within a defined service area.

**Credit:** A single unit of trade that quantifies the provision (or right of use) of a regulated or non-regulated ecosystem service.

**Credit registry:** A database and accounting system to track, register, certify, and bank credits and debits for an ecosystem marketplace. The system needs to accommodate credit definition and verification protocols across ecosystem services, geographies and jurisdictions. An ecosystem services credit registry differs from traditional commodity exchange platforms in that it will require strict performance standards, long contractual arrangements, and regular verification.

**Ecosystem services:** Ecosystem services are the benefits that human communities enjoy as a result of natural processes and biological diversity including (but not limited to) fish and wildlife habitat, the water cycle, filtration of air and water pollution, pollination, mitigation of environmental hazards, control of pests and diseases, carbon sequestration, avoidance of carbon dioxide emissions, and maintenance of soil productivity. Conservation and sustainable land and resource management can protect and promote ecosystem services.

**Ecosystem services markets:** Ecosystem service markets include the full spectrum of regulatory, quasi-regulatory (cap-and-trade) and voluntary mitigation markets, such as wetland mitigation banking, habitat/conservation banking, water quality trading, environmental water transactions and carbon markets.

**Ecosystem marketplace:** An ecosystem marketplace is a system where regulations and voluntary mechanisms are designed to provide financial incentives for the conservation and restoration of multiple types of ecosystem services.

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**Exchange:** An institution that inventories and accounts for all of the different credits available within a market or a marketplace by documenting their generation, ownership, and trade. An exchange generally requires credit traders to pass some sort of legitimacy or competency test prior to participation.

**Look-back period:** To ensure additionality it is typical to specify a date before which actions will not count towards the generation of credits or offsets.

**Mitigation:** Generally, a reduction in impacts. While used generically to refer to actions taken to reduce impacts, a more precise term is offset if the objective is no net loss as in regulatory programs that call for mitigation or offset of impacts (see below).

**Mitigation (or Offset) Programs:** In mitigation programs the emphasis is typically on regulations that call for 'no net loss' from that point forward. In other words the overall cap for pollution or resource use is set at current levels and no further increase in pollution or use is allowed (on net). In effect (or by default) all existing polluters and resource users are allocated permits equal to their current pollution or resource uses. Any entity that needs to produce additional pollution or increase their use of the resource then needs to find credits to offset this new pollution or resource use. Ideally, before assessing mitigation obligations the developer, resource user or polluter should first see what impacts can be avoided or reduced and then proceed to find a way to offset the remaining impacts – for example through protection or restoration of similar habitat, or reduction of resource use or pollution elsewhere.

**Mitigation or Conservation Bank:** A land account that is drawn on to compensate for adverse environmental impacts elsewhere.

**Multi-credit ecosystem market:** A centralized system of buying and selling multiple types of ecosystem services, both for regulatory (mitigation requirements) and non-regulatory (voluntary) purposes.

**Offset:** Generally, the act of fully compensating for unavoidable impacts. In a cap and trade system an offset is an action carried out by a third party to generate credits (by reducing or avoiding pollution or resource use). These offset credits can then be sold to polluters or resource (often new) users. These offset credits are often called mitigation credits.

**Out of Kind:** Mitigation activities where the habitat functions and values created are not an exact equivalent to the impacted habitat functions and values being mitigated.

**Payments for ecosystem services:** Refers to the diversified portfolio of payments that can be gathered by a single landowner or manager for actions taken on a site. Income may be derived from the sale of certified products, like lumber, from incentive programs, and/or from the sale of credits in an ecosystem marketplace.

**Payment in Lieu:** In place of requiring a regulated entity from providing a mitigation project or mitigation credits, a payment in lieu program allows the entity to make a payment (in place of mitigation). The payment is usually made to a state fund or agency, or to an authorized or contracted non-profit. The recipient is then responsible for funding projects or transaction that provide the required mitigation. Payment in Lieu programs are an alternative or extension of a pure cap and trade program.

**Service Area:** The geographic areas in which a bank's credits may be applied to offset debits associated with impact sites.

**Single-credit market:** A market that allows for the generation and trade of one credit type.

**Stacking credits:** The creation of different credit types in the same geographic area. It allows landowners to market multiple ecological values at a single site, including those with and without specific geographic delineation.

**Verifier:** A person or institution that confirms actions taken on the landscape produce the desired ecological benefits necessary for credit creation.

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\* Compiled from Policy Cornerstones and Action Strategies for an Integrated Ecosystem Marketplace in Oregon by the Institute for Natural Resources (2008) and Willamette Partnership website (<http://www.willamettepartnership.org/about-markets/glossary>)

## VI. APPENDIX B – Description of SB 513 Working Group Process

The Working Group consisted of diverse interests including local, state and federal agencies; Indian tribes; conservation organizations; developers; and landowners from the private sector. OWEB also convened an Ad Hoc Group to advise and help frame policy issues under consideration by the Working Group. Staff and/or members of the Working Group provided regular updates to the Oregon Sustainability Board at each of its meetings from September 2009 until November 2010, and obtained feedback from this group about the SB 513 implementation process and recommendations. The Working Group also invited input from interested members of the public.

The Working Group held nine meetings between December 2009 and October 2010, and the Ad Hoc Group met four times between November 2009 and September 2010, to deliberate on the state's sustainability goals and the challenges to and opportunities for facilitating development of ecosystem services markets and payment programs in Oregon to help meet these goals. OWEB worked with staff from the Oregon Consensus Program at Portland State University to contract for facilitation assistance from Kearns & West for the SB 513 process (both the Working Group and Ad Hoc Group). The Institute for Natural Resources (INR) provided policy-analysis support to the Working Group.

The Working Group initiated its work by drafting a vision statement and guiding principles for integrated ecosystem services markets in Oregon; the vision statement and principles were refined based on input from the Ad Hoc Group (see next section). The Working Group completed review of several case studies offered by group members that demonstrate impediments to an ecosystem marketplace that currently exist and areas where agencies and ecosystem marketplace practitioners are making progress (see Appendix). They identified four priority policy areas that must be addressed to create an ecosystem marketplace:

- A. Overarching ecological, economic, and integration goals to guide the development of integrated ecosystem services markets in Oregon;
- B. Agency processes and interactions to address appropriate roles at local, regional, state and national scales;
- C. Public/private financing issues; and
- D. Private and government roles in developing standards, methodologies, metrics and tools.

Small subgroups were formed around each of these policy areas. Subgroups discussed specific issues that have limited progress toward developing integrated markets, and suggested preliminary solutions to address these challenges, including policy recommendations, administrative changes and other actions that would be undertaken over the short, medium, and long term (see Appendix). The Working Group identified high-priority recommendations and action items from the subgroups' work, then convened a report drafting committee to assist with development of the final report and recommendations.

## VI. APPENDIX C – Case-Study Synthesis

### *Case 1: Family Tree Farm --*

Ken Faulk is the owner of Family Tree Farms and wants to sell ecosystem services on his lands. He could choose to maximize salable carbon credits, but understands that maximizing carbon values on his land may lead to degradation of important wildlife habitat and biodiversity. If credits and funding were available for both, through bundling or stacking, then perhaps better overall outcomes could be created. But until such a regime is created, the Family Tree Farm is allowed to decide for itself how and whether it conserves habitat, so long as its conservation practices do not violate the Oregon Forestry Practices Act.

### *Case 2: Water Quality Trading for Temperature --*

In many areas of the state, water bodies are too warm to support healthy salmon populations. The Department of Environmental Quality (DEQ) is responsible for determining why this problem exists and how to solve it. For example, in the Willamette Basin, DEQ estimates that 85% of instream warming is caused by non-point sources (e.g., reduction in shading due to loss of streamside vegetation, alteration of stream channels and flows) and 15% by point sources (e.g., wastewater discharges). To improve conditions in the Willamette Basin, DEQ allows wastewater dischargers to invest in projects that increase streamside shade (e.g., purchase thermal credits from an ecosystem services market) to prevent instream warming rather than install wastewater chillers. This type of investment is called “water quality trading.” DEQ allows water quality trading for temperature because it believes that shade restoration will have a greater benefit for salmonids than reducing wastewater temperatures with chillers. Chillers have negative impacts: they are expensive to operate and increase energy consumption and greenhouse gas emissions. While DEQ encourages water quality trading, legal and scientific challenges to implementing successful trades exist. DEQ often faces litigation that may take years to resolve over wastewater discharge permit terms or the assignment of pollutant loads to different contributors. In addition, instream outcomes for native fish, such as habitat improvements, can be difficult to translate into an offset for a wastewater discharger. For example, habitat improvements usually result in instream cooling but actual cooling is difficult to quantify. Without a reliable and integrated approach that addresses the link between ecological improvements, state temperature criteria, sources of thermal pollution, and various state and federal rules, potential participants in water quality trading are often hesitant to sell or buy temperature credits.

### *Case 3: Nelson’s Checkermallow --*

The Oregon Department of Transportation (ODOT) routinely engages in construction activities that have impacts on land that must be mitigated under §404 of the Clean Water Act and the Endangered Species Act (ESA). ODOT sought to purchase or create credits on 40 acres of land containing both wetland and ESA credits for the endangered Nelson’s Checkermallow, a small plant. Although there was a landowner willing to sell, he was only interested if he could sell not just those 40 acres, but his entire 250-acre parcel. Both the uplands and lower wet areas were ecologically important to the maintenance of long-term wetland functions, so creating a bank on just 40 acres probably was not viable over the long term or a good investment by the State of Oregon. ODOT believed it was legally precluded from purchasing the entire parcel, as it would have been deemed “surplus property” not related to its legal mandate, even if it had generated wetland or species credits that could be sold to other parties later. Defenders of Wildlife alerted several other potential investors (i.e., a private bank developer, nonprofit conservation organizations, the tribe and resource agencies), but nothing happened and the property was sold to another buyer.

*Case 4: Camas Wetlands --*

Wildlands, Inc., a private developer of conservation and mitigation banks, sought to create and bank credits under the ESA, §404 of the Clean Water Act, and the Oregon Removal-Fill Law. Wildlands identified these credits on a private property in Camas Valley near Junction City and purchased an option on the land. They then sought negotiations with two of the lead agencies – the Oregon Department of State Lands (DSL) and the U.S. Fish and Wildlife Service (FWS). The different agency goals ended in a stalemate: FWS, as administrator of the ESA, was interested in preserving total land for listed species, while DSL was governed by their Removal-Fill regulations to provide for “no net loss” of wetlands that requires them to focus more on restoration than on conservation of intact resources. Because the land’s wetlands were already of high value, DSL found few opportunities to certify credits. While FWS was comfortable assigning ESA credits regardless of DSL’s accreditation, DSL feared that if FWS awarded species premiums on the land it would encourage excessive wetlands losses. Without assurance and guidance from higher level officials that both types of credits could be created and accepted, the deal eventually fell through.

*Case 5: Agate Vernal Pools --*

Because of its routine need for credits ODOT has attempted to streamline their construction projects that affect “low quality habitat” by mitigating them through purchase of an 80-acre vernal pool wetland. The Agate vernal pool represents high quality habitat with both potential wetland and habitat credits for endangered vernal pool species. However, there were conflicting policies between several of the regulatory agencies involved with approval of this project: DSL, FWS and the Oregon Department of Fish and Wildlife (ODFW). These conflicting policies and lack of agreement on ecological priorities/outcomes among agencies for a time prevented a workable solution that could meet the needs of all agencies in a mutually acceptable fashion. For example, ODOT had a need for mitigation credits and, through this project, was attempting to generate and use credits. However, ODFW’s mitigation policy discourages mitigation and credit trading for irreplaceable habitat or habitat for which mitigation is not available. ODOT maintained strong commitment to achieving success with this project. Ultimately, an agreement on the Agate vernal pool was negotiated that involved a third party serving as a credit banker, a long-term conservation easement, and monitoring of project outcomes.

*Case 6: Gales Creek --*

The Gales Creek Restoration Project is restoring watershed health with the intent of benefitting both fish and people. Credit sellers were landowners with an interest in preservation. Funds were procured from a variety of sources, including water quality temperature credit-buyers like Clean Water Services and the DSL. DSL agreed to take on substantial project risk and buy credits with funds from their “fee in lieu” program, funded by development which cannot avoid wetland destruction or mitigate it on site. The Willamette Partnership also helped create and bank additional credits for salmon and temperature. The Interagency Review Team was successful in part because of the procedural leadership volunteered by the Army Corps of Engineers. The negotiations, contracts, and logistical arrangements have been completed and construction began in the Summer of 2010.

*Case 7: Renewable Energy – Ecosystem Banking Interest Investigation --*

Working Group members surveyed eight entities involved in the renewable energy market. Those surveys included three renewable energy companies: Horizon Wind, Iberdrola, and PacifiCorp; two agencies focused on energy and energy transmission systems, Bonneville Power Administration and the Oregon

Department of Energy; two energy policy advocates, Renewable Northwest Project and Northwest Gas Association; and Shorebank. They were asked how they thought ecosystem service markets could benefit their processes.

Potential credit buyers, energy and transmission companies, had already developed internal mitigation teams to conform with the law at great cost. Perhaps because of these efforts, they were skeptical about outsourcing their legal compliance to mitigation bankers. That skepticism might be alleviated if the bank-to-regulator link could be shown to be efficient, certain, final, standardized, and predictable. The last thing buyers want is to outsource the purchase of credits, only to find that they had purchased a legal headache or a list of ongoing and uncertain commitments. Rather, they would like to write the check and be confident that it would transfer long-term risk away from themselves and onto the bankers or regulatory approvals. Buyers and the Department of Energy recognize that habitat is dynamic and suggested larger-scale (1000 acre+) preservation parcels might mitigate those risks better. Shorebank pointed out that private lending for these credits would be easier if the rights to their profits could be tracked and traded through something akin to the Uniform Commercial Code (UCC) and the risk reinsured by the government. As it happens the UCC does not preclude creation of security interests in credits that would make them bankable, but the concern demonstrates the need for a broad-based education component to state policy facilitating markets.

## VI. APPENDIX D – Findings of Subgroup IV Methodology Evaluation Process

Tools of various kinds and in various stages of development were selected by the Institute for Natural Resources to be assessed by Subgroup IV for recommendations to the Working Group. Descriptions of the tools and links to their web sites were provided on the Ecosystem Commons portal, where interested people could view the tools, post comments, and vote on their usability in three types of markets: voluntary, compliance, and incentive.

This process was not envisioned as a means to select and endorse one particular tool, but instead a part of a much longer process of tool development that is likely to continue for some years. Seven tools were filtered through this process, and tool-specific findings were presented to the Working Group:

- i. ARIES, InVEST, and Ecosystem Portfolio Model (EPM) are all decision support tools that measure ecosystem functions and/or services. They are the most used and respected of these types of tools that we have seen. The DOI is currently testing all three in a series of pilots. They all function at a landscape scale.
- ii. HEA and BBOP should also be considered as both are intended as tools to calculate trade-offs. These tools provide a framework for the transaction measurement (although in HEA's case at least, it needs to be combined with something that actually measures functions). These systems have been the most used and tested of this type of metric.
- iii. EcoMetrix and Counting on the Environment are also well suited to the criteria, but less well known than the others, and have been developed with an Oregon focus, at least initially. Nonetheless, Counting on the Environment was recognized by reviewers as good for stacking ecosystem credits; having strong institutional buy-in to date; and good applicability to different markets – compliance, voluntary, and incentives. Ecometrix was seen to have good functional acre and functional linear feet concepts, and be strong at the site level.

### Overall Findings

1. The list of ideal criteria provides an important starting place. It sets goals toward which to make forward progress.
2. Identification of ideal tools requires much deeper analysis. Not surprisingly at this stage of development, there is typically insufficient information about these tools available on the Web, making it difficult determine out assumptions that are built into these. Example transactions where each tool used would have been helpful. (Note: Business for Social Responsibility is taking these and several other tools and applying them around the country during late 2010, with focus on mitigation needs, and federal agencies are taking on a similar effort.)
3. It is critical to test all tools in pilot contexts. Pilots help provide spatial data for metrics.
4. Integrating scales—from landscape to project level—is challenging for these tools to achieve at present.

5. Integrating services is an existing problem from a policy perspective. After this has been addressed, tools can be refined to assess the full spectrum of resources.
6. Counting on the Environment and Ecometrix are heading in the right direction. Both still need to separate supply and demand sides, and deal with stacking and measurability.
7. Different approaches require different levels of certainty/specificity about calculations—incentives markets have the lowest need, voluntary a moderate need, and regulated markets the highest need. Truly coarse-scale tools not suitable for compliance, but may work for voluntary markets.
8. Tools need to work nationally. Regulatory needs of federal agencies and the cost of developing tools that can address such needs will require involvement by the federal government. The tools also need to be designed with usability in mind.
9. Bundling and stacking are central considerations. Some values are bundled from the beginning (e.g., wetland and habitat), so there is a need to resolve what can be measured and stacked and what is inherently a bundled credit.